



Cambridge International AS & A Level

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MATHEMATICS

9709/12

Paper 1 Pure Mathematics 1

February/March 2026

1 hour 50 minutes

You must answer on the question paper.

You will need: List of formulae (MF19)

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen. Do **not** use correction fluid or tape.
- Do **not** write on any bar codes.
- If additional space is needed, you should use the lined page at the end of this booklet; the question number or numbers must be clearly shown.
- You should use a calculator where appropriate.
- You must show all necessary working clearly; no marks will be given for unsupported answers from a calculator.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.

INFORMATION

- The total mark for this paper is 75.
- The number of marks for each question or part question is shown in brackets [].

This document has **16** pages. Any blank pages are indicated.



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1 The equation of a curve is

$$y = x^3 - 3x^2 + 9.$$

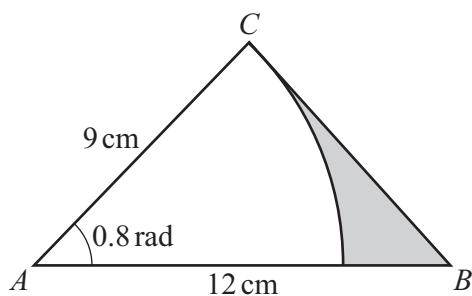
Find the coordinates of the stationary points of the curve and determine their nature.

[5]

(This area contains horizontal dotted lines for writing.)



2



The diagram shows a triangle ABC with $AB = 12$ cm, $AC = 9$ cm and angle $CAB = 0.8$ radians. An arc with centre A and radius 9 cm is drawn inside the triangle as shown. The shaded region is bounded by this arc, the line segment BC and part of the line segment AB .

- (a) Find the perimeter of the shaded region. Give your answer correct to 3 significant figures. [4]

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- (b) Find the area of the shaded region. Give your answer correct to 3 significant figures. [3]

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3 The graph of $y = ax^2 + bx + c$ has its vertex at $(3, -5)$ and intersects the y -axis at $(0, 31)$.

(a) Find the values of the constants a , b and c .

[4]

[illegible]

(b) The graph is translated by the vector $\begin{pmatrix} -2 \\ 7 \end{pmatrix}$.

Find the equation of the translated graph.

[2]

[illegible]



4 The function f is defined by

$$f(x) = \frac{2x+1}{x-3}$$

for $x < 3$.

(a) Find an expression for $f^{-1}(x)$. [3]

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(b) Given that

$$ff(x) \equiv \frac{px+q}{r+sx},$$

find the possible values of the integers p , q , r and s . [3]

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5 (a) Prove the identity

$$\frac{1}{1 - \sin \theta} + \frac{1}{1 + \sin \theta} \equiv \frac{2}{\cos^2 \theta}. \quad [3]$$

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(b) Hence, solve the equation

$$\frac{3}{1 - \sin \theta} + \frac{3}{1 + \sin \theta} = 12$$

for $0^\circ \leq \theta \leq 360^\circ$. [4]

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6 The equation of a circle is

$$x^2 + y^2 = \frac{45}{4}.$$

(a) State the centre and radius of the circle.

[2]

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(b) The line $x + y = \frac{3}{2}$ intersects the circle at the points A and B .

Find the exact distance AB .

[6]

[illegible]

- 7 The equation of a curve, C , is such that

$$\frac{dy}{dx} = \frac{(x-3)^2}{\sqrt{x}}.$$

The curve passes through the point $(4, 7)$.

- (a) Find y in terms of x .

[5]

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- (b) The equation of a different curve, D , is also such that $\frac{dy}{dx} = \frac{(x-3)^2}{\sqrt{x}}$. This curve instead passes through the point $(4, k)$.

Describe, in terms of k , the transformation that maps curve C onto curve D .

[2]

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8 (a) Find the complete expansion of $(3 - 2x)^4$.

[3]

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(b) Use your answer to **8(a)** to find $(3 - 2\sqrt{2})^4$. Give your answer in the form $p + q\sqrt{2}$, where p and q are integers to be determined. [3]

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$$x^{\frac{2}{3}} + (8x)^{\frac{1}{3}} = 24.$$

[4]

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- 10** The 7th term of an arithmetic progression is 77. The sum of the first n terms of the progression is denoted by S_n . It is given that $S_{11} = 880$.

(a) Find the 20th term of the progression.

[4]

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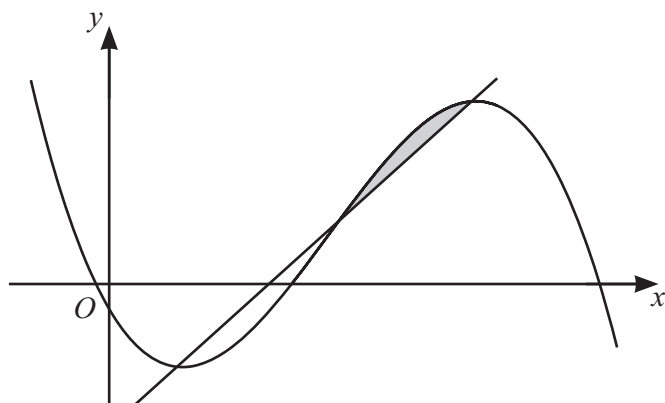
(b) Find the smallest number of terms, N , such that $S_N < 50$.

[4]





11



The diagram shows the curve with equation $y = -x^3 + 9x^2 - 15x - 3$ and a straight line. The straight line passes through the two stationary points of the curve.

- (a) Show that the equation of the straight line is

$$y = 8x - 18.$$

[5]

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(b) Verify that the curve also meets the straight line when $x = 3$.

[1]

(c) The shaded region is bounded by the curve and the straight line.

Find the area of the shaded region.

[5]



[illegible]

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